Habitat Fragmentation

By: Eileen Connell

What is Habitat Fragmentation?

Natural

- Rivers
- Volcanoes

Anthropogenic (Human-Made)

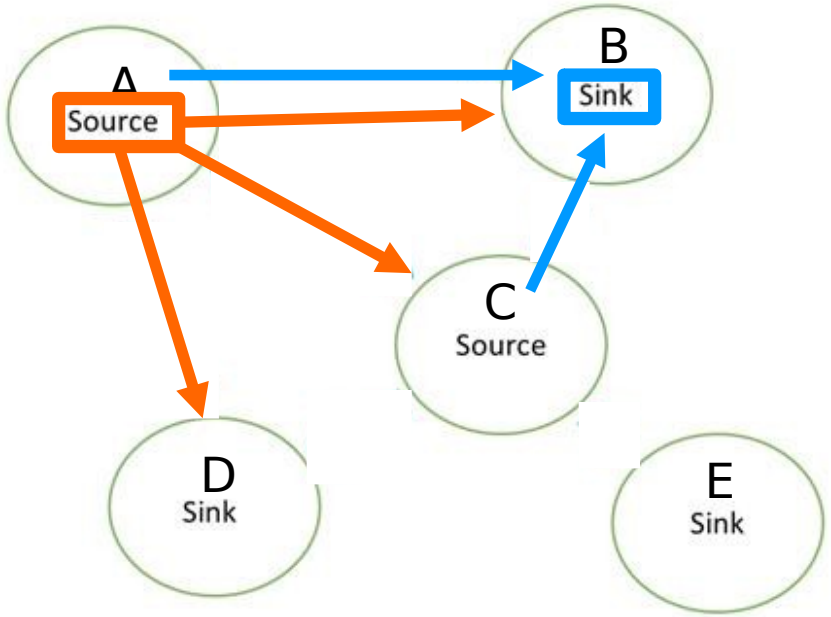
- Roads
- Forest Removal

Metapopulation

- **Metapopulation:** a group of populations separated by space but consisting of the same species
  - Cons: Food; Space; Mates; High Predation
  - Pros: a chance for more “fitted” species to arise
- **Subpopulation:** individuals of the same species that are grouped together

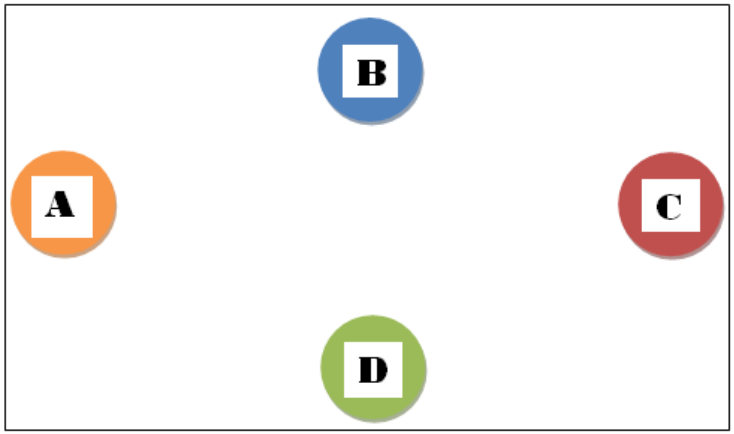
Source & Sink

- **Source:**
  - **Emigration** will occur but no **Immigration**
  - No NEW individuals
  - Birds spreading out from one individual tree collection & thriving
- **Sink:**
  - **Immigration** will occur but no **Emigration**
  - Always NEW individuals
  - A lizard going into a desert, not being able to thrive there



GAME TIME

- *A forest has been recently disrupted by plans to build a new housing development. The roads and houses have now fragmented the habitat.*
- Working in pairs, Play the Metapopulation Game
- Observe any Changes by using arrows, moving beads, and removing beads
- Beads represent <u>fur color</u> in each environment



RULES

- Starting with Subpopulation “A”
  - Roll Dice
  - Pick up an Action Card
  - Complete Action
  - Place Arrow on Board to show movement
- In the case where one circle contains two or more different colors and emigrates, equal amounts should be taken
- Stop when no more Action Cards Remain
- Identify Source & Sink Populations

Metapopulation Review

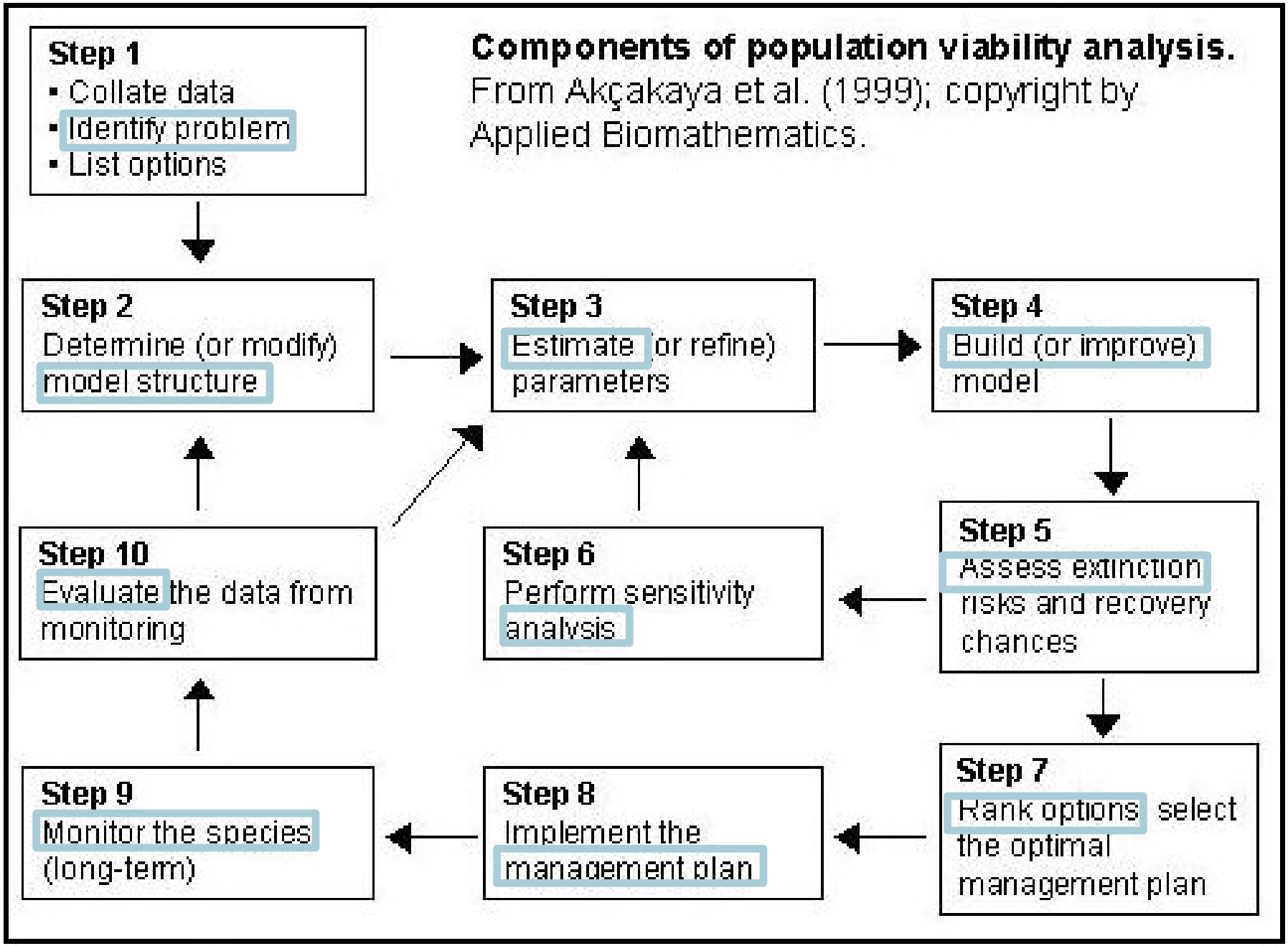
- Are there equal amounts of each bead after playing the game?
- Why might it be a problem for individuals to die off in a specific subpopulation?
- Can you identify a Source & a Sink subpopulation?
- What do you think is the best solution?

How Can We Help ?

- **Viability Analysis:** determines the probability that a population will become extinct within a given number of years
  - **Example: Fender's Blue Butterfly & Island Fox**
- **Corridors, or habitat pathways, may help individuals safely move between subpopulations**
  - Pros:
    - There is habitat between subpopulations
  - Cons:
    - May not be big enough
    - Larger risk for predation
    - Confined area

Replay the Metapopulation Game

1. Identify two subpopulations to connect a corridor
    1. Example: “A” & “B”
2. At the beginning of each turn of that population pick up all the beads in both subpopulations and shake in hand
    1. At the beginning of “A”’s turn
    2. At the beginning of “B”’s turn
3. Separate beads equally back into the subpopulations without looking
    1. Both populations will have a mixture of the two populations


Step 1
• Collate data
• Identify problem
• List options
Components of population viability analysis.
From Akçakaya et al. (1999); copyright by Applied Biomathematics.
Step 2
Determine (or modify) model structure
Step 3
Estimate (or refine) parameters
Step 4
Build (or improve) model
Step 5
Assess extinction risks and recovery chances
Step 6
Perform sensitivity analysis
Step 7
Rank options select the optimal management plan
Step 8
Implement the management plan
Step 9
Monitor the species (long-term)
Step 10
Evaluate the data from monitoring

Career Connection

- Conservationist
  - Fighting for the Protection & Conservation of the Environment
- Ecologist
  - Studying & Learning about Species Interacting with Each Other & Other Organisms
- Geneticist
  - Testing for Genetic Variation & Viability Analysis (probability that a population will go extinct within a given number of years)